

REMARKS

Applicants acknowledge receipt of the Office Action dated March 20, 2008, in which the Examiner rejected claims 1-7, 9, 10 and 13-16 as anticipated by Shilling (US 5615115); rejected claims 8, 11, and 12 as obvious in view of the combination of Shilling with Van Den Beukel (US 20050149267). Applicants respectfully traverse these rejections for the reasons set out below.

Amendment to Claim 1

Claim 1 has been amended solely for the purpose of improving the language therein. The amendments do not alter the scope of the claim.

Rejection of claims 1-7, 9, 10 and 13-16 as anticipated by Shilling

In support of the rejection, the Examiner asserts that Shilling discloses a method meeting the limitations of at least claim 1. Applicants respectfully disagree. Shilling is merely an example of conventional methods for calculating a pore pressure gradient profile using the Eaton method of 1975. The Eaton method is referred to in US 5,615 115. See column 2, lines 9-16; and in the last step of claim 1.

Shilling discloses a method of generating a pore pressure profile at a proposed drilling location, namely a second proposed well site (5, 7) that is some distance from an existing well (well 2 in Figure 1). According to Shilling, an “overburden gradient” is determined from density log data obtained in the existing well. The overburden gradient is determined as a relationship of cumulative average density as a function of increasing depth. See column 5 lines 64-66, and column 6 lines 34-39. Using common depth points (CDPs) determined from seismic data, the data from the first well can then be used to extrapolate pore pressure data for the proposed wells. Notably, however, Shilling does not teach using stress data to detect non hydrostatic pressure.

In column 3, lines 12-14 Shilling states that the overburden gradient “corresponds to the rate of change of stress in the formation.” It is important to note, however, that the overburden gradient in Shilling is determined using known methods, namely density log data, and not stress values. The only other mention of “stress” in Shilling relates to fracture gradient. Shilling does not disclose or suggest a method or system that includes any measurement of formation stress states. Likewise, the passages cited by the Examiner in support of specific features in the dependent claims simply do not contain the disclosures for which they are cited. Thus, Applicants respectfully submit that the claimed invention is novel.

Furthermore, Shilling teaches away from the present invention. As a further step in the method for determining a pore pressure Shilling teaches determining a “normal compaction trend line” See column 3 lines 21-24. As is stated in column 2, lines 16-21, “the normal

compaction trend line corresponds to the increase in formation density ... that would be expected as a function of increasing depth due to the increasing hydrostatic pressure that forces fluids out from the formations and thus increases sonic travel time, assuming the absence of geopressure." (emphasis added).

The present invention does not require an assumption of a hydrostatic pressure regime. By suggesting that the determination of pore pressure can be made from a normal compaction trend line that is based on assumptions about hydrostatic pressure, the reference teaches away from the invention. One advantage of using the method and system of the present invention is that it is possible to detect regions that deviate from a predicted hydrostatic pressure regime.

For all of these reasons, Applicants respectfully submit that the present claims are novel and non-obvious over the art of record.

Rejection of claims 8, 11, and 12 as obvious in view of the combination of Shilling with Van Den Beukel

Claims 8, 11, and 12 depend from claim 1 and are allowable for the same reasons set out above.

New claim

Notwithstanding the foregoing remarks, in order to further illuminate the invention, new claim 17 has been added, which depends from claim 1 and further requires that the region of interest is ahead of the measurement region. This demonstrates that in some embodiments, the present method can be used to determine pore pressure in a region that has not yet been entered by the drill bit. The amendment is supported in the specification at p. 1, ll. 24-25 and p. 13, ll. 22-26. New claim 17 is also allowable for the reasons set out above.

Conclusion

Applicants believe that the present amendments place the case in condition for allowance. Applicants therefore respectfully requests that Examiner enter the amendments and allow the case. In the event the Examiner has any questions or issues regarding the present application, the Examiner is invited to telephone the undersigned prior to the issuance of any written action.

Respectfully submitted,
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